TECHNICAL INFORMATION ON BUILDING MATERIALS

TIBM - 45

FOR USE IN THE DESIGN OF LOW-COST HOUSING

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MISCELLANEOUS PAINT DRYING OILS AND PAINT DRIERS

This is chiefly a digest of sections of the following publications of the Bureau of Standards dealing with Tung oil, Perilla oil, Menhaden oil, Soy-bean oil, paint driers, and applicable Federal Specifications.[1]

Circular No. 69, "Paint and Varnish", (November 17, 1917).[2]

Technologic Paper No. 66, "Detection of Resin in Drier", (January 15, 1916),[3] by E. W. Boughton.

Technologic Paper No. 274, "Use of United States Government Specification Paints and Paint Materials", (December 15, 1924),[4] by P. H. Walker and E. F. Hickson.

Tung Oil or Chinese Wood Oil

Source: Tung oil is imported from the Orient, where it is produced from nuts of certain trees of the genus Aleurites.

Properties: This oil differs from linseed and other drying oils in that it dries to a white opaque, wax-like film. It has a very characteristic odor,

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[1] Specifications adopted by the Federal Specifications Executive Committee and approved by the Director of Procurement, Treasury Department, for use of all departments and establishments of the Government. Copies of all Federal Specifications mentioned in this digest may be obtained from Superintendent of Documents, Washington, D. C. (Price 5 cents)

[2] Out of print and no longer available by purchase, but may be consulted in Government depository libraries.

[3] Available from Superintendent of Documents, Washington, D. C. (Price 5 cents)

[4] Available from Superintendent of Documents, Washington, D. C. (Price 10 cents)

and a very high specific gravity (not less than 0.939 at $\frac{15.5^{\circ}C}{15.5^{\circ}C}$). Tung oil is generally cooked with resins or drying agents such as compounds of lead, manganese or cobalt, and then thinned with turpentine or mineral spirits. The cooking process changes the oil so that it dries with a glossy rather than a flat surface. However, in recent years, a special heat process has been invented; for example, U. S. Patent No. 1,903,686, April 11, 1933; whereby the oil, free from any resins or other admixtures, dries to a glossy finish.

Use: Tung oil is used in varnishes, some of which are of excellent quality. Treated tung oil is used in some ready-mixed or prepared paint, although it commands a higher price than linseed oil. It is also used in floor paint and floor enamels, exterior paints for concrete, stucco, and brick, and in interior washable wall paints.

Perilla Oil

Source: Perilla oil is obtained from the seeds of several species of "perilla"[1] grown in China, Japan, and India.

Properties: The oil has a specific gravity of 0.932 to 0.937 at $\frac{15.5^{\circ}C}{15.5^{\circ}C}$, an iodine number of 190 to 206, the highest of any known oil, and possesses the ability to absorb considerable oxygen. It closely resembles linseed oil, to which it is considered superior by the American Society for Testing Materials, and the National Paint, Varnish and Lacquer Association, Inc.

Use: Perilla oil is used in enamels, varnishes, and paints.

Menhaden and Sardine Oils

Source: Menhaden and Sardine oils are obtained from fish, while most other drying oils are of vegetable origin.

Properties: Samples of the oil vary greatly, especially in iodine number which ranges from 139 to 193. The specific gravity varies from 0.926 to 0.937 at $\frac{15.5^{\circ}C}{15.5^{\circ}C}$.

Use: Some authorities state that when fish oil is used as an adulterant in linseed oil, it is deleterious; while others recommend it for use in smoke-stack paints and zinc paints for seashore exposures. In recent years, very pale, refined, fish oils have appeared on the market. Some of these oils are nearly water white in color, and have a very mild odor. They are being used in enamels, to impart flexibility to the film. For certain uses, fish oil is superior to linseed oil. It is in the interior paints that the largest increase in the use of fish oil has developed in the last five years. The greatest strides have been made in the field of heat-bodied and blown-fish oils.

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[1] Perilla is a small genus of Asiatic Mint.

Soy-Bean Oil

Source: Soy-bean oil is extracted from soy beans grown extensively in Manchuria and Chosen (Korea). Soy beans have been grown successfully in practically every State in the eastern half of the United States. The Soy-bean industry is a very important one in this country, and use of the oil in paint and synthetic resin enamels is increasing.

Properties: Specific gravity of this oil ranges from 0.922 to 0.927 at $\frac{15.5°C}{15.5°C}$. and the iodine number from 124 to 143. The oil dries slowly, forming a soft film. When properly treated, soy-bean oil possesses the valuable properties of imparting elasticity and flexibility to films, and prevents yellowing in interior paints and enamels.

Use: Generally speaking, soy-bean oil should not be used in the raw state in the drying oil field. Refined soy-bean oil is mixed with perilla and China wood oils in outside house paints. A mixture of 8 parts linseed oil, 4 parts soy-bean oil, and 1 part processed tung oil has been suggested. Soy-bean oil is sometimes used to adulterate linseed oil because it is inexpensive. Certain colors ground in soy-bean oil have proven more satisfactory than when the same pigments were ground in linseed oil.

Paint Driers

Types and Composition: Paint driers[1] usually consist of solutions of lead manganese and cobalt salts of the acids of linseed oil or resins or mixtures of such salts in volatile solvents, such as turpentine or light petroleum oil. Commercial driers on analysis show from 2 to 10% ash containing lead, manganese, and cobalt and sometimes calcium; and from 60 to 95% volatile thinner usually consisting of turpentine, mineral spirits, or a mixture of both.

Although certain pigments, such as red lead, act as driers, and some driers are available in paste form, most so-called driers are in liquid form, commonly called "driers", "oil driers", "Japan driers",[2] or simply "Japans". Strictly speaking, an "oil drier" should contain no varnish resin and when used alone should not dry to a hard film. A "Japan drier" should contain both resin and linseed oil, and when used alone it should dry to a hard film having considerable adherence. This distinction is not, however, adhered to in the trade, and many manufacturers use the term so loosely

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[1] Drier is "a material containing metallic compounds added to paints and paint materials for the purpose of accelerating drying": STANDARD DEFINITIONS OF TERMS RELATING TO PAINT SPECIFICATIONS, American Society for Testing Materials, A.S.T.M. Standards (1933), pp. 735-739.

[2] Japan driers should not be confused with "grinding Japans", which are special kinds of hard-drying varnish used to grind fine colors to paste form for coach painting; or with "baking Japans", which are varnishes that after partial or complete drying are heated to a rather high temperature, thus partially fusing the coating.

that the name can not be taken as an indication of whether the material contains resin or not. Resin is added to the drier to prevent precipitation of metallic soaps after thinning and to decrease the tendency of the drier to "curdle" with oil.

Use: Drier is added to promote the drying of oil in paints, and should be used only in the smallest possible amount to produce the desired result. It should not be used in place of volatile thinner. The amount of drier used in paints varies. Some pigments require more than others, and with paints containing essentially the same pigments, more drier will be required for dark colors than for light.

Federal Specifications: See TT-D-651, "Drier; Paint, Liquid" covering two types of liquid paint driers; those for general use, containing lead; and those for special lead-free paint, containing no lead. This specification applies both to straight oil drier; that is, material free from resins or "gums", and to Japan drier; that is, material containing resins or "gums".